

PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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| Applicant's or agent's file reference AP102178/KS | FOR FURTHER ACTION | | See Form PCT/PEA/416 |
| International application No. PCT/FI2005/000156 | International filing date (day/month/year) 17.03.2005 | Priority date (day/month/year) 25.03.2004 | |
| International Patent Classification (IPC) or national classification and IPC INV. D21F1/56 | | | |
| Applicant PROCESS FLOW LTD OY | | | |
| <p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 4 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau a total of 4 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p> | | | |
| <p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p> | | | |
| Date of submission of the demand 04.10.2005 | | Date of completion of this report 08.05.2006 | |
| Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465 | | Authorized officer Clivio, E Telephone No. +49 89 2399-7251  | |

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/FI2005/000156

Box No. I Basis of the report

1. With regard to the **language**, this report is based on
- ☒ the international application in the language in which it was filed
 - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
 - ☐ international search (under Rules 12.3(a) and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4(a))
 - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

Description, Pages

| | |
|---------|----------------------------------|
| 1, 3-13 | as originally filed |
| 2, 2a | filed with telefax on 21.04.2006 |

Claims, Numbers

| | |
|------|----------------------------------|
| 1-11 | filed with telefax on 21.04.2006 |
|------|----------------------------------|

Drawings, Sheets

| | |
|---------|---------------------|
| 1/7-7/7 | as originally filed |
|---------|---------------------|

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☒ The amendments have resulted in the cancellation of:
- ☐ the description, pages
 - ☒ the claims, Nos. 12,13
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing *(specify):*
 - ☐ any table(s) related to sequence listing *(specify):*
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing *(specify):*
 - ☐ any table(s) related to sequence listing *(specify):*

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/FI2005/000156

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | |
|-------------------------------|-------------|------|
| Novelty (N) | Yes: Claims | 1-11 |
| | No: Claims | |
| Inventive step (IS) | Yes: Claims | 1-11 |
| | No: Claims | |
| Industrial applicability (IA) | Yes: Claims | 1-11 |
| | No: Claims | |

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item V

1. Prior art

Document D1 = SU-A-590390 discloses (the references in parentheses applying to this document):

An apparatus for a paper machine (paper making machine deckle bar), comprising a deckle rail (rib (4)) for supporting the edge of a stock layer on a wire (strip (3)) of a forming table (see figures), means for leading water (water (1)) to the vicinity of the deckle rail (see figure 1), whereby said apparatus comprises openings (channels (5); see also figure 2) in the lower surface of said deckle rail for leading water directly between said deckle rail and said wire, for sealing the gap between said deckle rail and said wire.

2. Problem

The problem to be solved by the present invention may therefore be regarded as, how to reduce the friction between stock and rail while reducing the needed amount of lubricating water.

3. Solution

The apparatus comprises openings in the inner edge of said deckle rail facing the wire for leading of water between the deckle rail and the stock layer.

These features are not known nor suggested by the available prior art.

The independent claims 1 and 5 seem therefore to be novel and inventive.

Claims 2-4, 10, 11 and 6-9 are dependent on claims 1 and 5 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

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2. Fabric edge curler reflects edge leakage inwards as an edge wave causing a downstream broadening edge disturbance in the machine direction.

3. No dewatering is directed at the fabric edge curler area, as the wire is not in contact with the table. This increases the stock imbalance of the edge area and impairs controllability.

4. Fabric edge curler functions differently when the driving parameters of the machine vary, such as the slice opening, machine speed and the underpressure of the dewatering. The disturbances caused by the fabric edge curler are thus difficult to remove in a machine that runs different grades.

5. The fabric edge curler stretches the wire causing a greater mechanical strain and thus faster wearing of the wire.

6. The deckle rail gets easily dirty, wherefore separate and often complicated washing solutions of the deckle rail have been developed.

Document SU-A-590390 discloses a deckle rail with channels for water flow in the inner edge of the deckle rail. The curved ribs define the direction of water flow through the channels for water flow between the deckle rail and the stock layer in order to reduce friction.

Documents FR 2128252 and US 5045154 disclose deckle rails with means for leading water from inside the deckle rail between the deckle rail and the wire for sealing the space between the deckle rail and the wire.

THE AIM OF THE INVENTION AND BRIEF DESCRIPTION

The main object of the present invention is to reduce or even to eliminate the problems found in the prior art described above.

The primary aim of the present invention is to eliminate significant shortcomings and problems related to current edge support, whereby the section of a paper or board web that corresponds to the edge areas can be improved in terms of

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quality and in accordance with the operating values of the machine. The aim is to thus prevent the stock deficit caused by current technology and the leakage flow directed towards the edge of the wire in the edge areas of the web by extending the support of the deckle rail-type far downstream on the forming
5 table. Such mechanical support requires, depending on the type of implementation, a reduction in friction between the stock and deckle rail by means of so-called lubricating water as well as the hydraulic sealing of the gap between the deckle rail and the wire by means of so-called sealing water.

CLAIMS

1. Apparatus in a paper machine, comprising

– at least one deckle rail (8) for supporting the edge of a stock layer (10) on a wire (5) of a forming table,

5 – means for leading water to the vicinity of the deckle rail (8),

characterised in that the apparatus comprises openings

– in the inner edge of the deckle rail (8) facing the wire for leading of water between the deckle rail (8) and the stock layer (10) for lubricating of this gap, and

10 – in the lower surface of the deckle rail (8) for leading water directly between deckle rail (8) and the wire (5), for the sealing of the gap between the deckle rail (8) and the wire (5) with water in the manner of a hydrodynamic sealing.

2. Apparatus according to claim 1, **characterised** in that, the inner edge of the deckle rail facing the wire and/or the lower surface of the deckle rail is of a porous material.

3. Apparatus according to claim 1 or 2, **characterised** in that, at the end of the deckle rail means have been arranged for feeding water substantially in the machine direction for supporting the edge of the stock layer on the wire.

4. Apparatus according to any of the claims 1 - 3, **characterised** in that, the deckle rail (8) is substantially long, comprising the majority, e.g. 50 – 99 % of the length of the forming table, extending at least nearly from the head box (1) at least nearly to the dry line.

5. Method in a paper machine, in which

– stock is fed to the wire (5) of the forming table in a paper machine to form a stock layer,

– the edge of the stock layer (10) is supported by at least one deckle rail (8) on the wire (5),

characterised in that, in the method water is brought inside the deckle rail (8) and

- the gap between the deckle rail (8) and the stock layer (10) is lubricated by leading water from inside the deckle rail (8) between the deckle rail (8) and the stock layer (10), and
- the space between the deckle rail (8) and the wire (5) is sealed with water by leading water from inside the deckle rail (8) between the deckle rail (8) and the wire (5) in such a way that the sealing is achieved in the manner of a hydrodynamic sealing and the sealing water has a smaller pressure loss and therefore a leakage flow towards the stock layer.

6. Method according to claim 5, **characterised** in that, the lubricating water is led through the inner surface of the deckle rail (8) facing the wire directly between the deckle rail (8) and the stock layer (10).

7. Method according to claim 5 or 6, **characterised** in that, the sealing water is led through the lower surface of the deckle rail (8) facing the wire directly between the deckle rail (8) and the wire (5).

8. Method according to any of the claims 5 - 7, **characterised** in that, in the method dewatering takes place substantially on the entire width of the web, extending to the inner surface of the deckle rail.

9. Method according to any of the claims 5 - 8, **characterised** in that, in the method water (19) from the end of the deckle rail (8) is fed substantially in the machine direction for supporting the edge of the stock layer (10) on the wire (5).

10. Paper machine, comprising a forming table, **characterised** in that, in connection with the forming table is an apparatus according to any of the claims 1 - 4.

11. Paper machine according to claim 10, **characterised** in that, the forming table lacks means for bending the edges of the wire (5) of the forming table upwards.